

Standards Process for Earth Science Data Systems

Status of this RFC

This RFC provides information to the NASA Earth Science community. This RFC does not specify an Earth Science Data Systems (ESDS) standard but has gone through a review process similar to that for ESDS standards. Distribution is unlimited.

Change Explanation

Changes in Version 3

- Fixed grammar in Section 1, paragraph 2, sentence 1.

- Added explanatory paragraph at end of 4.2.2 to better explain how SPG and TWG conduct reviews.

- Updated Figure 4-1 to reflect the text (to show "Technical Note" and "Reject" paths)

Changes in Version 2

- Incorporated Errata from Version 1 (sections 4.1.3 and 4.3).

- Minor revisions to section 1 (Introduction) and extensive revisions to section 4.2 (Standards Approval Process) to reflect evolution in standards process as discussed at the Earth Science Data Systems Working Groups meeting November 2006.

- Deleted subsection 3.2.2 to reflect compressed standards review cycle.

- Deleted section 3.3 (Categorization of Standards)

- Deleted large part of section 4.1 to conform to new process decided on by Standards Process Group.

- Added section 2.2 "The NASA ESDS Program Executive" to match ESDS-RFC-001.

- Other minor editorial corrections throughout.

Version 1 – Initial version

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Abstract

This document describes the process of endorsement of standards by the ESDS Standards Process Group. It describes the process of developing the initial standards Request For Comment and then describes the process by which it can become an ESDS standard. Descriptions of the players and documents are included.

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1 Introduction

The primary goal of the ESDS standards process is to facilitate interoperability among components of the NASA Earth Science network of data systems. Establishment of appropriate standards enables flexibility as future data and service providers will have well-defined access points to join the NASA Earth Science network of data systems. This flexibility is central to supporting the evolving strategies of NASA's Earth Science activities. In order to accomplish these goals, the standards process needs to focus on endorsing standards that are relevant to the NASA Earth Science network of data systems and that have mature implementations and demonstrable operational readiness. The standards process is also designed to encourage community participation in order to leverage community expertise, ideas, and capabilities.

In studying examples that could serve as models for the ESDS process, the SEEDS Standards Study Team found the Internet Engineering Task Force (IETF, <http://www.ietf.org>) experience to be particularly pertinent. The IETF has been remarkably effective in setting standards for the Internet - enabling explosive growth both in user base and in functionality. Its process has demonstrated scalability and relevance amid rapidly evolving technology. The IETF process provides simplicity of structure, technical excellence, prior implementation and testing, clear and concise documentation, openness and fairness, and potential for timeliness. For these reasons, the standards process is modeled after the IETF process [3]. As described below, the ESDS standards process has been adapted to meet additional NASA Earth Science mission requirements of assured timeliness and accountability and to assure domain applicability and operational readiness of standards recommended by the Earth Science Data Systems Working Groups.

A primary concern is to foster endorsement of a set of "working edge" standards. That is, in order to endorse a proposal as an ESDS standard, there must be evidence both of successful domain implementation and demonstrable operational readiness. Community input is sought to ensure broad review and garner broad support.

The focus on working standards means that decisions are oriented towards the **endorsement** of standards rather than the **development** of standards. There are a number of reasons for this. Foremost is the fact that standards under active development present moving targets and are often not stable enough for widespread operational use. The development of standards can be time consuming and expensive. As there are already many venues where standards are under active development, the goal of the ESDS standards process is therefore to provide a means whereby standards that are already implemented and have proven their usefulness in the NASA Earth Science context can be further adopted into general use by NASA. By thus expanding the use of "good" standards, those standards become even more useful.

In structure, the ESDS standards process consists of gathering input, publishing the proposed documents, gathering public comment, and deciding whether the process should move ahead or not. The completion of the process results in recommendations to NASA Earth Science management on endorsement of well-specified standards or technical notes.

2 The Players

The players involved in the NASA Earth Science Data Systems standards process include the following:

2.1 NASA's Earth Science Management

The role of NASA's Earth Science management in the standards process is to perform such financial, legal, and logistical tasks as necessary and to act on recommendations from the SPG as appropriate.

2.2 The NASA ESDS Program Executive

Throughout this document we refer to the NASA individual charged with overseeing the NASA Earth Science Data Systems Working Groups as the "NASA ESDS Program Executive". The NASA ESDS Program Executive is responsible for final approval for all SPG recommendations.

2.3 The Standards Process Group (SPG)

The Standards Process Group (SPG) is the decision-recommending board of the standards process. SPG decisions have force only with NASA ESDS Program Executive concurrence. The membership of the SPG and their roles are detailed in Sections 4 and 5 of ESDS-RFC-001.

2.4 RFC Editor

The primary standards process documents are called Requests For Comment (RFCs) defined in section 3 below. The RFC editor is responsible for logistical coordination of an RFC including assuring that RFC submittals follow SPG standards for content coverage and format and that the RFC library is maintained and is accessible. The editor advises submitters on content and format, but the ultimate responsibility for providing a sufficient RFC in acceptable format rests with the author(s) of the RFC.

2.5 Technical Working Groups (TWGs)

Technical Working Groups (TWGs) are commissioned by the SPG to perform specific review and evaluation of candidate standards, related implementations, and operational readiness. Membership on a TWG is partially drawn from the SPG membership and partly drawn from technical area experts and/or NASA Earth Science community members. The duration of a TWG corresponds to the review period for a particular candidate standard.

2.6 Process Participants

Process participants are individuals, but they may often act as representatives of stakeholder programs, projects, tasks, or communities affected by standards under consideration. There is no restriction on who may be a process participant, but direct stakeholders funded by NASA's Earth Science activities necessarily dominate the process of endorsing ESDS standards.

2.7 Public

The public includes all process participants, all NASA Earth Science stakeholders, and all those who are generally understood to be the “public”. Any person may make comments on RFCs under consideration. Specific procedures to ensure fair and appropriate opportunities for public comment are maintained by the SPG.

2.8 Stakeholders

Stakeholders are those who are materially affected by the work of the SPG. The SPG has a direct interest in stakeholders because the success of standards recommended by the SPG is ultimately determined by the use of those standards by programs, projects, tasks, or other activities directed by or performed by SPG Stakeholders.

3 Categorization of Request For Comments (RFCs)

The primary process documents are called Requests For Comment (RFCs) and are similar to the RFCs established by the IETF. However, the SPG's RFCs have been tailored to meet NASA Earth Science Data Systems' unique requirements and needs. There are two main tracks for processing of RFCs. Those containing technical information relevant to NASA ESDS activities, but not suitable for standardization, are assigned to the Technical Track and may become Technical Notes. Those RFCs considered to be suitable for standardization are assigned to the Standards Track, defined below.

A unique ESDS-RFC number, listed in the header, identifies each RFC. In addition, the header contains the RFC category (technical note or standards track), the RFC status (updates, obsoletes), the author's name, the submission date, and a title. RFC numbers are assigned by the RFC Editor after a review and evaluation of the proposal by the SPG.

3.1 Technical Note

A technical note is a document that contains useful information but is not a standard. A proposed standard that went through the standards process and did not become a standard may be designated a technical note by the SPG because it contained important and useful information. Standards process participants can also directly submit proposed technical notes. A proposed technical note must be relevant to the domain of NASA Earth Science data systems, serve a useful purpose, be technically of high quality, and be well written.

3.2 Standards Track

The standards track is the path by which a proposed standard can be endorsed officially as an Earth Science Data Systems standard after going through the standards process detailed in this document.

3.2.1 Proposed Standard

An ESDS proposed standard must: be relevant to the domain of Earth Science data systems, be generally stable, have sufficient specificity, be well understood, and appear to enjoy enough community interest to be considered valuable. Furthermore, a proposed standard must be

technically of high quality, and must have at least two successful implementations demonstrating the standard has been fully tested and implemented in a real-world environment. It should be noted that in standards process terminology, a single independent implementation and an instantiation of the implementation by a different independent project counts as two independent implementations.

3.2.2 Recommended Standard

Finally, a draft standard may become an ESDS standard when significant and successful operational readiness has been determined, the standard has demonstrated a high degree of technical maturity, and also has garnered significant positive interest from the NASA Earth Science community. This process ensures that ESDS standards are well accepted and that they provide significant benefit to the NASA Earth Science community. Once recommended by the SPG and approved by NASA HQ, a standard is officially endorsed and encouraged for use in NASA Earth Science data systems.

4 ESDS Standards Process

This section describes the ESDS Standards Process. Sections 4.1 and 4.2 describe the two distinct phases of the process. The first phase consists of developing an RFC and the second phase consists of the process through which the RFC is approved. Figure 4-1 and the descriptions that follow contain cross-references in the form of numbered items.

4.1 Path to RFC

The RFC process might be set in motion by many sources of standards, or of requirements for standards. While developers or users of a standard or common practice may submit an unsolicited RFC to the SPG for consideration, standards-track RFCs may also be solicited in response to NASA Earth Science program or project requirements. A separate document, *ESDS-RFC-003 - Instructions to RFC Authors* [2], describes the form and content of an RFC.

4.1.1 Solicited

Standards track RFCs may be solicited in response to mandates from the NASA ESDS Program Executive, based on NASA requirements or on Congressional mandates, international agreements, inter-agency agreements, etc. The RFC may also be initiated in response to requirements from mission systems, science or applications groups, or other project needs.

The development of a technical standard is not part of this standards process. If NASA recommends development of a new standard or profile or extension of an existing standard, the NASA ESDS Program Executive will accomplish this development through any appropriate mechanism. These mechanisms may include issuance of new contract tasks, cooperative agreements, grants, or other procurements. Standards development may be accomplished by working through standards development bodies or may be independently pursued. After the independent standard development, the development bodies can submit their new standards to the SPG as a proposed standard.

Implementation may also be accomplished by assignment to existing NASA Earth Science projects or programs.

4.1.2 Unsolicited

A prime source for ESDS standards is the community of users, who may recommend standardization of particular tools, protocols, external standards, or formats that have been found to be particularly useful. In addition, a vendor may choose to document a particular implementation or format for possible adoption as an ESDS standard. These groups may draft an RFC documenting the potential standard and submit it to the SPG unsolicited.

Anyone can submit an unsolicited RFC as a technical note or for ESDS standards track consideration.

4.1.3 Adoption of Existing Standards

An RFC may propose use of standards already maintained by other groups, in order to consider NASA Earth Science Data Systems' use of the standard. An RFC may also propose profiles or extensions of existing standards. In this case, review of the parent standard is not required, but the RFC documenting the profile or extension must reference the base standard.

If a profile or extension is written such that the user needs a copy of the base standard to implement the profile/extension, then the SPG will keep a copy of the base standard on the SPG website, in addition to the profile/extension RFC. If only the profile/extension document is needed for implementation, then the SPG will keep a copy of the RFC only. In any of these cases, the SPG should provide link to current authoritative version of the base standard.

4.2 Standards Approval Process

A group or an individual can submit an RFC document to the SPG. Both standards track RFCs and technical note track RFCs will be evaluated for endorsement through the standards process. The evaluation is based on the standards specification, two independent implementations, and demonstrable operational readiness. As mentioned above, in the NASA Earth Science environment, a single independent implementation and an instantiation of the implementation by a different independent project count as two independent implementations.

Figure 4-1 shows the overall flow of the approval portion of the standards process: the initial screening and public review period gathering comments on three aspects of the proposed standard: the technical specification required for implementation, readiness for operational use, and usability or suitability of the technology to the uses for which it is proposed. All RFCs, review announcements, comments received, supporting documents and other related materials will be maintained by the SPG as outlined in Section 5.

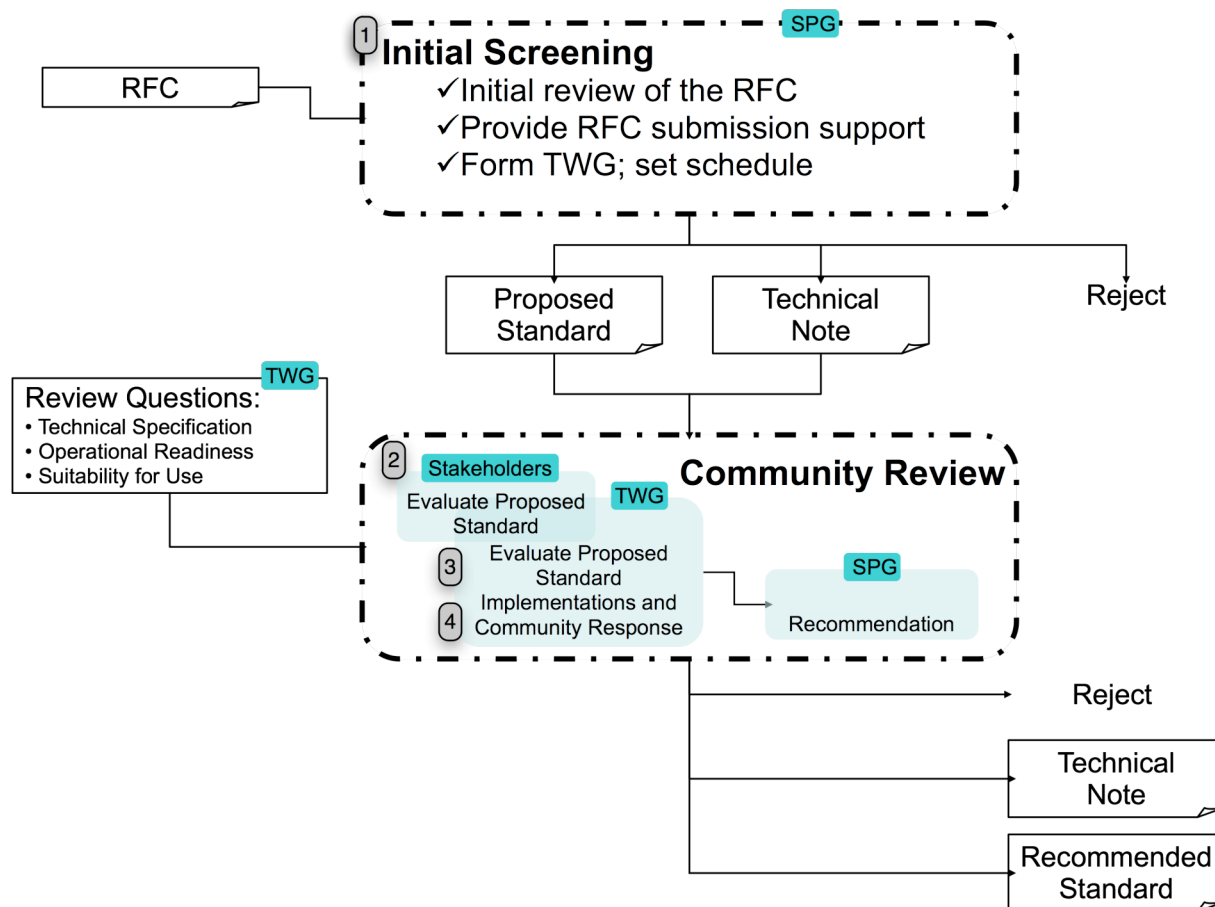


Figure 4-1: Path to Approval (Numbers in figure are referred to in text below.)

4.2.1 Initial Screening

(Figure 4-1 #1) The SPG will perform an initial evaluation and screening of the RFC to determine if it is a standards track document, or if the RFC is a technical note track document, or if the RFC lacks sufficient merit to advance further on the path to approval. Although all standards-track RFCs are evaluated on the complete set of required components (standards specification, two independent implementations, and operational readiness), in this initial screening phase the RFC needs to contain only the standards specification and a reference to one implementation. Information about the second independent implementation and operational readiness may be added later in the standards process.

If the RFC is without merit and rejected, the SPG will communicate this to the RFC author.

If the RFC is a technical note, then the SPG will evaluate the quality of the document, whether it serves a useful purpose, and whether it is technically worthy. SPG may invite experts to help with the evaluation for technical worthiness. If the RFC passes this evaluation, then the RFC will be permanently archived by the SPG and made available on the SPG website. If the RFC author requests a public evaluation of the RFC, then the SPG Chair will notify the NASA Earth Science community (along with a list of stakeholders identified by the RFC author) about the

requested evaluation when the Chair sends out the announcement of the RFC being accepted as an SPG Technical Note.

If the RFC is a proposed standard, then the SPG will form a TWG to give an objective technical evaluation of the proposed standard and its usefulness in NASA Earth Science Data Systems. The SPG will identify and select members of the TWG. The selection will be based on applications from NASA Earth Science community members who wish to be on the TWG, as well as identification and invitation of notable technical experts.

The TWG will set the review schedule for the proposed standard. The review schedule may vary based on the characteristics of the proposed standard. For example, a widely used standard may only need a short review cycle whereas a new, complex standard may need a longer review cycle.

The review schedule will include the dates of the expected SPG review. The TWG must complete its evaluations so that the review can commence on time. The SPG may adjust the schedule to accommodate unforeseen circumstances. However, ***simple lack of community or stakeholder input should not be sufficient cause to delay review. Indeed, lack of input might be an indicator that there is no active support for the proposed standard.***

4.2.2 Types of Reviews

How a document is reviewed depends largely on whether it describes a community-developed standard or an externally defined standard as well as whether or not it will be used to develop new implementations.

A proposed candidate standard can be one of three types:

- (1) A NASA community developed standard used within at least one self defined community; where the proposed standard has not been approved or adopted by an external standards organization; and where new implementations **are** expected to be developed from scratch, *using the proposed standard RFC as the implementation specification.*
- (2) A NASA community developed standard used within at least one self defined community; where the proposed standard has not been approved or adopted by an external standards organization; and where new implementations **are not** expected to be developed from scratch but *will use existing software libraries or code.*
- (3) A standard already approved by an external standards organization but which is being proposed for use for the NASA Earth science community.

There are three types of reviews that are potentially needed to evaluate a proposed standard:

- (1) A detailed technical specification review that determines the quality, accuracy, and clarity of the proposed specification. The detailed technical review ensures that implementers can use the proposed standard as an implementation specification for any future implementations with confidence.
- (2) A “usefulness” user review that determines if the proposed standard is useful or helpful or necessary to the user to carry out his work.

- (3) An operational readiness review that determines if the proposed standard can work in an operational setting in a NASA environment with NASA data.

A proposed standard where implementations are expected to be developed from scratch using the proposed standard needs to have all three types of reviews.

A proposed standard where implementations are expected using existing software libraries or code needs to have a “usefulness” user review and an operational review. The technical specification review should also be done although possibly with fewer reviewers who have implementation expertise.

A proposed standard where the standard is already approved by an external standards organization needs to have a “usefulness” review and an operational review. A technical specification review will not be done.

An “Evidence of Implementation” document will define the NASA community where the proposed standard is used. For that reason, the “Evidence of Implementation” document should be as comprehensive as possible, containing an exhaustive list of implementations as known. The contacts listed in this document will be used as the starting point by the SPG to solicit reviews of the proposed standard. Having an incomplete list of implementations or a very short list of implementations will imply that the community is very small or the proposed standard is not widely used.

To evaluate each proposed standard, the SPG will identify the “community.” The initial set of stakeholders in the community is the contacts list from the “Evidence of Implementation” document. The SPG can also identify other stakeholders to add to the list of community by any other means. The SPG will contact the community for each review phase. The SPG will also send a broad request for review through its public announcement list, soliciting reviews from the general NASA Earth Science community and its partners.

Specifications mentioned in standards track RFCs can vary widely in several key aspects, including where the specification is in its life cycle (leading-edge, mature, being replaced by newer specifications) and how widely used the standard is (small community of users, NASA-wide, industry-wide). The SPG and TWG will use that information to decide which reviews are necessary and how extensive the necessary reviews should be.

4.2.3 Public Comment Period

The TWG will conduct a public review of the proposed standard by reviewing the standards specification document and the independent implementations. If the RFC was submitted with only one implementation, then this phase will be postponed until the RFC author submits information about at least one more independent implementation. If the RFC author does not submit information about a second implementation within the allowed time limit, which is determined by the SPG, then the proposed standard will be rejected.

(Figure 4-1 #2) The SPG will announce a public review of the proposed standard and supporting information. The SPG may solicit key NASA Earth Science stakeholders to comment on some proposed standards.

(Figure 4-1 #3) The TWG will also meet and conduct its objective technical review and assessment.

(Figure 4-1 #4) The TWG evaluates the public comments and presents them, along with its technical assessment, to the SPG. An RFC that does not generate positive response or recommendations should not be promoted. It is not sufficient to have no negative feedback. Lack of positive feedback suggests that there is little active support for a proposed standard and could be an indicator that there will be little enthusiasm to employ it. If the proposed standard needs revision, the SPG will determine if the revisions needed are editorial in nature, in which case the proposed standard will continue in the standards track after the editorial revisions are completed, or whether the revisions needed affect the technical content of the proposed standard. If revisions affecting the technical content of the proposed standard are needed, the SPG will notify the RFC authors and the proposed standard will be rejected. The RFC authors may resubmit their RFC after completing the revisions and may re-enter the standards process at step 1, Initial Screening.

The SPG will make a recommendation to the NASA ESDS Program Executive on whether to endorse the proposed standard. The proposed standard can also be rejected at this phase for varied reasons, or designated to be a technical note. If the proposed standard is designated to be a technical note, the SPG will permanently archive the RFC and make it available on the SPG web site.

All ESDS standards will be available on the SPG web site. The SPG will also make available other related information, such as public comments, TWG recommendations, and meeting notes.

4.3 Document Maintenance

After an RFC is approved, further editorial changes may be required in order to correct errors or provide clarification. In such cases, the approved RFC may be modified, with internal review by the SPG. Substantive technical changes, however, may not be made to an existing RFC, but should be submitted for review in a new RFC.

In order to guard against releasing several new versions in quick succession, editorial changes may be captured in a separate Errata document. At the discretion of the RFC Editor (not necessarily original editor, but the responsible person appointed by SPG), a new version of the RFC may be issued, incorporating any existing errata and/or new changes.

5 Notice and Record Keeping

The SPG will maintain a web site containing the record of SPG standards-related activity that shall include at least the following:

1. The charter of the SPG [1]
2. Instructions to RFC Authors [2] and the RFC template
3. Announcements related to RFCs
4. Public comments
5. RFC documents and supporting materials as outlined in [2]
6. Minutes of SPG meetings.

7. A list of all RFCs and their status (e.g. where they are in the process; which ones are current standards, obsolete, etc.)

The web site will be maintained by NASA under the direction of the SPG Chair as appointed by the NASA ESDS Program Executive (see section 6.1 of ESDS-RFC-001)

References

Normative References

- [1] ESDS-RFC-001 - Charter of the Earth Science Data Systems Standards Process Group (SPG)
- [2] ESDS-RFC-003 - Instructions to RFC Authors

Informative References

- [3] S. Bradner, "The Internet Standards Process -- Revision 3," IETF RFC 2026, October 1996; www.ietf.org/rfc/rfc2026.txt.

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Appendix A Glossary of Acronyms

Acronym	Description
ESDS	Earth Science Data Systems
ESE	Earth Science Enterprise: See http://www.earth.nasa.gov/
ESIP	Earth Science Information Partners: See http://esipfed.org/
IETF	Internet Engineering Task Force: See http://www.ietf.org
ISO	International Organization for Standardization: See http://www.iso.org
NASA	National Aeronautics and Space Administration: See http://www.nasa.gov
RFC	Request For Comment: See Section 2 of this document.
SEEDS	Strategy for the Evolution of ESE Data Systems: SEEDS is the name given to the study that produced the initial concept for the ESDS Standards Process. See http://eos.nasa.gov/seeds
SPG	Standards Process Group: See Section 2 of this document and also ESDS-RFC-001 [2].
TWG	Technical Working Group: See Section 2.5 of this document.